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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/408,921	09/30/1999	ANTHONY J. RICCI	LAM1P118	4619

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EXAMINER	
BUEKER, RICHARD R	

ART UNIT	PAPER NUMBER
1763	

DATE MAILED: 04/22/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	09/408,921	RICCI ET AL.	
	Examiner	Art Unit	
	Richard Bueker	1763	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *20 January 2004*.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1,2,4-7,11-14,18,40 and 43-45* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1,2,4-7,11-14,18,40 and 43-45* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

Claims 18 and 44 are rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the written description requirement. The claim(s) contains subject matter which was not described in the specification in such a way as to reasonably convey to one skilled in the relevant art that the inventor(s), at the time the application was filed, had possession of the claimed invention. In claims 18 and 44, the phrase "where a second machining of only ceramic surfaces that are not exposed to plasma is performed after the annealing process" is new matter. In particular the phrase "only ceramic surfaces that are not exposed to plasma" was not in the specification as originally filed.

Claims 1, 2, 4-7, 11, 44 and 45 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention. In claim 1, the phrase "the micro-defects" lacks proper antecedent basis.

Claims 12-14, 18 and 43 are rejected under 35 U.S.C. 103(a) as being unpatentable over Maydan (5,746,875) taken in view of Aihara I (U.S. 6,258,440) or Aihara II (JP 10-167859). Maydan discloses a plasma-based fabrication apparatus that includes a ceramic gas distribution plate (GDP) having a plurality of holes that supply plasma gases. Maydan's GDP has a machined surface. Maydan teaches that it should be pre-treated to reduce particulates but does not discuss annealing for reducing undesirable particulates. Aihara (I and II) teaches that a ceramic part having a machined surface that is intended to be used in a plasma based fabrication apparatus should be annealed after the ceramic part is machined. Aihara teaches that this annealing step will eliminate the undesirable particulates that are otherwise produced

when the ceramic part is used in the plasma-based fabrication apparatus. Aihara specifically teaches (col. 5, line 9) that his annealing step is applicable to a shower plate, which is a GDP. Aihara's annealing temperature is within the range recited in applicants' claim 12 (see, for example, Invention Examples 3 and 4 at col. 6, lines 16-53 of Aihara). It would have been obvious to one skilled in the art to anneal the ceramic GDP of Maydan in the manner taught by Aihara, because Aihara teaches that his annealing process will help to eliminate the particles that that Maydan desires to eliminate.

Regarding the citation of both Aihara documents in the above rejection, it is noted that Aihara II (JP 10-167859) is the Japanese language priority document for Aihara I (U.S. 6,258,440). Aihara I has a typographical error at col. 7, line 34, in the section labeled "Invention Example 6", where the reference to "Comparative Example 1" should be "Comparative Example 2". The original Japanese language priority document (translation attached) makes this clear. Thus, it is clear that "Invention Example 6" of Aihara is directed to the Aluminum Nitride embodiment disclosed by Aihara. This is the reason for including a citation of JP 10-167859 in the rejection.

Claims 12-14 and 40 are rejected under 35 U.S.C. 103(a) as being unpatentable over Herchen (5,819,434) taken in view of Aihara I (6,258,440) or Aihara II (JP 10-167859). Herchen (see Figs. 3 and 4, and col.5, lines 11-18) discloses a ceramic GDP for use in a plasma-based fabrication apparatus, that is formed by machining, which includes a machined surface through which a plurality of holes pass. It would have been obvious to one skilled in the art to subject the ceramic GDP of Herchen to an

annealing treatment after machining, as taught by Aihara I and II, for the desirable purpose of reducing the generation of particles when the GDP is used in a plasma-based fabrication apparatus. Regarding the recitation of drilled holes in claims 1 and 40, it is noted that this is a product-by-process limitation that is not structurally distinguishable from the holes of Herchen's GDP.

Claim 40 is rejected under 35 U.S.C. 103(a) as being unpatentable over Herchen (5,819,434) taken in view of Aihara I (6,258,440) or Aihara II (JP 10-167859) for the reasons stated above, taken in further view of Maydan (5,746,875) (col. 2, lines 3-4) and Chen (5,824,605) (col. 8, lines 8-17), who teach that it was conventional in the prior art to drill the gas distribution holes in a ceramic GDP. It would have been obvious to one skilled in the art to drill Herchen's holes, because Maydan and Chen teach that it was known in the art to form GDP holes by drilling.

Claims 1, 2, 4-7, 11, 18 and 43-45 are rejected under 35 U.S.C. 103(a) as being unpatentable over Herchen (5,819,434) taken in view of Aihara I (6,258,440) for the reasons discussed in the rejection of claims 12-14 and 40 above, and taken in further view of Maydan or Wicker III (WO 98/14980) or Kim (6,041,733), and in further view of Aihara III (6,099,794) and Takahashi (JP 60-81076). Claims 1, 2, 4-7, 11 and 43-45 are now limited to a GDP including at least one of Si_3N_4 and SiC. The GDP of Herchen's preferred embodiment is constructed of aluminum oxide, but Herchen (col. 5, lines 1-10) also teaches that the particular material used to fabricate the GDP is determined largely by the chemical resistance required for a particular process chemistry. Herchen teaches that other ceramics can be used as appropriate for the process chemistries

involved. Maydan (col. 6, lines 17-20) and Wicker III (paragraph bridging pages 10 and 11) both teach that Si_3N_4 is a desirable material of construction for a ceramic GDP, and Kim (Figs. 4 and 5 and col. 3, lines 63-66) teaches that SiC is a desirable material of construction for a GDP. In view of Maydan or Wicker III or Kim, it would have been obvious to use Si_3N_4 or SiC as the material of construction for Herchen's ceramic GDP. Regarding a step of annealing a Si_3N_4 or SiC GDP, Aihara I (col. 4, lines 7-18) and Takahashi (see the English translation) teach that it is desirable to anneal a Si_3N_4 or SiC article to improve its strength, and Aihara III (col. 4, lines 51-64) teaches that it is desirable to anneal a Si_3N_4 article to improve its strength. It would have been obvious to one skilled in the art to anneal a GDP made of Si_3N_4 or SiC as suggested by Maydan or Wicker III or Kim because strength is a desirable feature in any ceramic article. Also, Herchen (see the first sentence of the abstract, for example) teaches that strength is an important requirement for a GDP. Because Herchen desires a high strength GDP, it would have been obvious to one skilled in the art to anneal a Si_3N_4 or SiC GDP as taught by Aihara I, Aihara III and Takahashi to improve its strength. Furthermore, Takahashi teaches that the annealing step repairs surface cracks and scratches in a machined Si_3N_4 or SiC part. Since Aihara I teaches that it is desirable to remove such cracks and scratches in a GDP, it would have been obvious to anneal a Si_3N_4 GDP for this reason also. Regarding claim 18, it is noted that Aihara III (col. 4, lines 62-64) teaches that it is desirable to improve the dimensional accuracy of an annealed part by a 2nd machining step, and it would have been obvious to employ this further step when

producing a Si_3N_4 GDP, for the desirable purpose of improving its dimensional accuracy.

Claims 1, 2, 4-7, 11, 18 and 43-45 are rejected under 35 U.S.C. 103(a) as being unpatentable over Herchen (5,819,434) taken in view of Aihara I (6,258,440), taken in further view of Maydan or Wicker III (WO 98/14980) or Kim (6,041,733), and in further view of Aihara III (6,099,794) and Takahashi (JP 60-81076) for the reasons stated in the previous paragraph rejection, and taken in further view of Chen (5,824,605). Regarding the "drilled holes" recited in claim 1, Maydan (col. 2, lines 3-4) and Chen (col. 8, lines 8-17) teach that it was conventional in the prior art to drill the gas distribution holes in a ceramic GDP. It would have been obvious to one skilled in the art to drill Herchen's holes, because Maydan and Chen teach that it was known in the art to form GDP holes by drilling.

Claims 12-14, 18 and 40 are rejected under 35 U.S.C. 103(a) as being unpatentable over Schneider (6,263,829) taken in view of Aihara I (6,258,440) or Aihara II (JP 10-167859). Schneider discloses a plasma-based fabrication apparatus having a plate shaped support 20 (Figs. 1-7) with gas distribution channels and orifices. The support 20 is properly considered a gas distribution plate, and it contains portions (insert 140) having a machined ceramic surface (col. 7, lines 10-51) in which insert 140 includes a drilled or machined orifice (col. 7, lines 49-51). Schneider teaches that it is more desirable to use monocrystalline ceramics for the insert 140 because polycrystalline ceramics cause more particulates in a plasma environment. Aihara, however, teaches that polycrystalline ceramics can be used for parts of a plasma

apparatus without causing undesirable particulate contamination, if the polycrystalline ceramic material is annealed after machining. It would have been obvious to one skilled in the art to modify the apparatus of Schneider by using annealed polycrystalline ceramic inserts 140 in Schneider's gas distribution plate 20, because Aihara teaches that such an annealed insert will accomplish Schneider's purpose of avoiding particulate contamination.

Claims 1, 2, 4-7, 11, 18 and 43-45 are rejected under 35 U.S.C. 103(a) as being unpatentable over Schneider (6,263,829) taken in view of Aihara I (6,258,440) for the reasons discussed in the rejection of claims 12-14 and 40 in the preceeding paragraph, and taken in further view of Aihara III (6,099,794) and Takahashi (JP 60-81076). Schneider (col. 7, lines 13-20) teaches the use of Si_3N_4 or SiC for his gas distribution plate. Regarding a step of annealing a Si_3N_4 or SiC GDP, Aihara I (col. 4, lines 7-18) and Takahashi (see the English translation) teach that it is desirable to anneal a Si_3N_4 or SiC article to improve its strength, and Aihara III (col. 4, lines 51-64) teaches that it is desirable to anneal a Si_3N_4 article to improve its strength. It would have been obvious to one skilled in the art to anneal a GDP made of Si_3N_4 or SiC as suggested by Schneider because strength is a desirable feature in any ceramic article. Furthermore, Takahashi teaches that the annealing step repairs surface cracks and scratches in a machined Si_3N_4 part. Since Aihara I teaches that it is desirable to remove such cracks and scratches in a GDP in order to reduce particulate contamination, it would have been obvious to anneal a Si_3N_4 GDP for this reason also. Regarding claim 18, it is noted that Aihara III (col. 4, lines 62-64) teaches that it is

desirable to improve the dimensional accuracy of an annealed part by a second machining step, and it would have been obvious to employ this further step when producing a Si_3N_4 GDP, for the desirable purpose of improving its dimensional accuracy.

Claims 1, 2, 4-7, 11-14, 18, 40 and 43-45 are rejected under 35 U.S.C. 102(e) as anticipated by or, in the alternative, under 35 U.S.C. 103(a) as obvious over Wicker I (5,993,594). Wicker discloses a GDP made by hot pressing silicon nitride at a temperature above 1500° C (col. 7, lines 34-38). Wicker teaches (col. 3, lines 33-42) that his GDP results in much reduced particulate generation and much lower rate of chemical reaction with process gases. In view of the product-by-process nature of applicant's claims, the GDP of Wicker is prima facie not distinguishable from the presently claimed GDP.

Regarding the rejection of claim 12, applicants have argued that nothing in these references teaches or suggests annealing at a controlled temperature between about 1500° C to 1600° C for a time from about 5 to 10 hours. It is noted, however, that example 4 of Aihara I includes annealing at 1600° C for 3 hours, and example 6 includes annealing at 1700° C for 4 hours. Annealing time periods of 3 hours and 4 hours read on the claimed 'about 5 hours'. Also, the annealing temperatures of 1600° C and 1700° C read on the claimed 'about 1600° C'. More importantly, it is noted that the present claims are product claims, while the claim limitations pertaining to the duration and temperature of annealing are process limitations that do not so limit the claims.

Applicants have argued that Aihara I at col. 4, lines 8-18, teaches away from annealing bodies made of Si_3N_4 or SiC. It is noted, however, that the passage of Aihara cited by applicants only teaches away from using Si_3N_4 or SiC in an apparatus that uses the particular halogen based corrosive gases, which Aihara is concerned with. The other prior art of record teaches that a GDP constructed of Si_3N_4 or SiC can be used in plasma processing apparatus using other types of gases.

Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Richard Bueker whose telephone number is (571) 272-1431. The examiner can normally be reached on 9 AM - 5:30 PM, Monday-Friday.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Gregory Mills can be reached on (571) 272-1439. The fax phone number for the organization where this application or proceeding is assigned is (703) 872-9306.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (703) 308-0661.

Richard Bueker
Primary Examiner
Art Unit 1763